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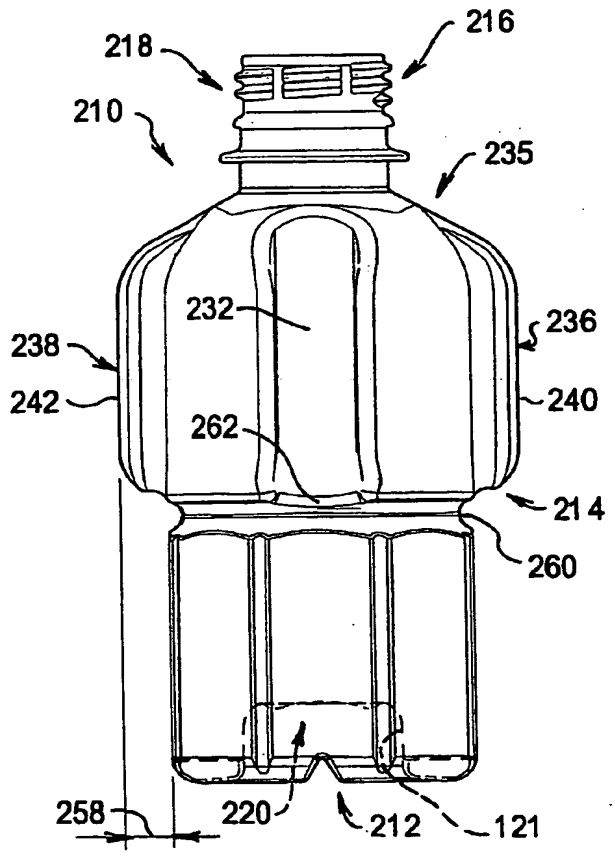
(54) Title: MODULAR BOTTLE



(57) Abstract: A modular bottle (210) which can be fitted to other like modular bottles as a constructional toy. The base of the bottle has a recess (220) into which the neck finish (216) of another bottle can be inserted so that the two bottles are releasably interlocked or secured end to end. The side walls (214) of the bottle have a male connecting rib (236, 238) and a female connecting groove (232, 234). The male rib of one bottle can be inserted into the corresponding groove of another bottle either by sliding the rib into the groove, or by press fitting the rib into the groove, so that two bottles can be releasably interlocked or connected side by side. When there are two male ribs and two female grooves on the sidewalls of a collection of bottles, three dimensional constructions can be made after the beverage contents of the bottles have been consumed.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

MODULAR BOTTLE

Field of the Invention

The present invention relates to packaging containers, in particular to bottles. It will be convenient to describe the invention with particular reference to bottles for containing beverages although the invention may have wider application.

Background of the Invention

Bottles for packaging of beverages come in a wide variety of shapes and sizes but conventionally have a base, a neck finish and a sidewall extending from the base to the neck finish.

Often when more than one bottle is packaged, they are placed in a flat array according to the desired package size. It is difficult to stack known bottles vertically on top of each other, as the base of a bottle on the top layer is usually not adequately supported by the neck finish of a bottle on the lower layer.

Modular bottles can have tessellated shapes which may facilitate stable vertically stacking. In this regard, a projecting portion from the top of the bottle may be able to fit into a complimentary indentation in the base of a similar bottle, so that the base is not only supported but also somewhat laterally restrained. These types of bottles usually have a neck finish cross-sectional area that is similar to that of the base to provide the required stability.

However, these types of bottles are usually large in size, and merely allow a bottle to rest on top of another bottle without providing any degree of structural integrity. A 2 or 3-dimensional array of such bottles can be easily knocked over with a horizontal force. To secure a 3-dimensional array of these types of bottles, one method is to use lateral band packaging techniques such as shrink wrapping which can maintain the integrity of the array as a whole.

It would be desirable to provide a modular bottle that can be connected to other modular bottles which provides a more structurally stable connection between the bottles.

With most packaging, once the packaged product has been consumed, the packaging is discarded although the packaging material may be recycled for remanufacture into further packaging or into some other product. Consumers may sometimes refill emptied bottles with other contents, but generally, emptied containers are only reused by consumers as containers. It is now considered desirable to provide a container which may be used by consumers once emptied of its contents as a modular construction toy. This may have particular appeal to small children. Accordingly it is an object of the invention to provide a bottle which has features to allow it to be connectable to a like bottle for play purposes.

Summary of the Invention

In one aspect of the present invention there is provided a modular bottle having

a neck finish;

a base;

a sidewall extending between the neck finish and the base.

the sidewall having at least one male engagement portion

and at least one complimentary female engagement portion

wherein the male and female engagement portions are configured such that the male engagement portion of said modular bottle may be engaged with the female engagement portion of an identical second such modular bottle such that the two bottles are releasably interlocked together.

In one embodiment, the two bottles to be joined together are of identical shape, although it will be appreciated that bottles of different sizes may be joined provided that they have the necessary complementary features.

The sidewall has at least one male engagement portion and at least one complementary female engagement portion so that the male engagement portion from a first modular bottle may engage with the female engagement portion of an identical second modular bottle for releasably engaging or interlocking the two containers together. The male and female engagement portions are configured and engage so that the two containers are positively engaged and interlocked together and resist separation. In a preferred embodiment, the male engagement portion consists of projection on one bottle and the female engagement portion consists of a wall defining a recess and the projection and recess are complementary in cross-section. In one embodiment the projection of one bottle is substantially "C" shaped in transverse section, and the corresponding recess of another bottle is also substantially "C" shaped such that there are undercut regions in at least a portion of the periphery of the projection and undercut regions in at least a portion of the walls of the recess. This feature will be described more fully in relation to the drawings. The undercut regions facilitate the positive interlocking of adjacent bottles. The undercut regions may extend all or part way about the projection(s) and recesses or grooves.

In another preferred form of the invention, the sidewall of the modular bottle also includes a plurality of longitudinal grooves. The sidewall may also have a plurality of complementary projections so that projections from a first modular is adapted to releasably interlock with a longitudinal groove on a second modular bottle.

In one preferred embodiment, the modular bottle may have a groove that is at least one longitudinal channel which extends in the direction of the neck finish towards the base ie. is parallel with the vertical axis of the bottle. Such channel or channels may extend continuously along the sidewall from the neck

finish to the base or they may extend only partly between the neck finish and the base. In at least this preferred embodiment, the projection that is included in the sidewall may be a continuous rib that is substantially complimentary in transverse section to the channel so that adjacent modular bottles can releasably interlock with each other. In an alternate embodiment of the invention, instead of a continuous rib, the projections may consist of a plurality of knobs or protrusions to engage and interlock with the corresponding groove of another bottle. Alternatively, the channels and ribs/knobs may extend laterally across the sidewalls.

The grooves and projections may be engaged and interlock together by the click fitting method described previously, or alternatively by sliding when the indentation is a channel or concurrently have the capacity for both types of engagement – depending on the choice of the person assembling bottles together.

In a preferred embodiment, the neck finish of the first modular bottle and the wall surface defining a recess in the base of the second modular bottle engage so that the two containers are positively engaged together. The positive engagement of the neck finish and the wall surface of the recess may be achieved in a variety of different configurations.

In one embodiment, the neck finish of the first modular bottle and wall surface recess of the second modular bottle may engage by a click fit mechanism wherein a portion of the neck finish is inserted into the recess until it is restrained inside the recess. Either the neck finish of the first bottle or the wall surface in the base of the second bottle may have a projecting portion such as a rib or knob which cooperates with corresponding groove or indentation in the recess or neck finish of the second bottle, so that when the two bottles are joined they are positively located or locked by the cooperating features.

In one embodiment an audible click may be heard when the neck finish has been restrained in the recess of another bottle. It is more preferred that the wall surface of the recess includes a feature which cooperated with a

conventional feature of a conventional neck finish configuration in order that conventional closures do not need to be modified, which may otherwise be the case if the neck finish were to include special features to engage with the wall surface of the recess.

In an alternate embodiment, where a thread is provided on the neck finish of the first modular bottle, a corresponding groove in the wall surface of the recess of the second modular bottle may be provided so that the neck finish may be screwed into the recess of a second modular bottle so that the two containers are positively engaged together.

In yet another embodiment, the wall surface of the recess may be tapered from the base inwardly so that when the neck finish of a first modular bottle is inserted into the recess of the second modular bottle, a friction fit is provided for the necessary engagement.

In a preferred embodiment the neck finish of a bottle releasably engages with the wall surface recess of a second bottle when no closure is on the neck finish of the first bottle, although in another embodiment, the wall surface and hence recess are configured to.

Advantageously, the present invention provides a modular bottle which can be connected to at least a second modular bottle and provide either a horizontal 2-dimensional array, a vertical 2-dimensional array, or a 3-dimensional array. Conveniently, the modular connectability can be provided when the bottle is filled or when it is empty. This provides a suitable option for the bottle after usage, such as a modular interlocking toy for children.

The above and further features and advantages of the present invention, will be evident from the following detailed description of preferred embodiments with reference to the accompanying drawings, in which:

Brief description of the drawings

Figure 1 is a side elevation of a bottle of the present invention.

Figure 2 is a top plan of the bottle of Figure 1.

Figure 3 is an alternate side elevation of a bottle of the present invention.

Figure 4 is a side elevation of an alternate embodiment of a bottle of the present invention.

Figure 5 is a side elevation of yet a further alternative embodiment of a bottle of the present invention.

Figure 6 is an alternative side elevation of the bottle of Figure 5.

Figure 7 is a bottom plan of the bottle of Figure 5.

Figure 8 is a top plan of the bottle of Figure 5.

Figure 9 is a cross section of the bottle of Figure 5 along line A-A.

Figure 10 is a cross section of two bottles identical to that of Figure 5 as shown in Figure 9 when joined.

Figure 11 shows a perspective view of an array of modular bottles of the present invention connected together.

Detailed description of the preferred embodiments

Features in Figures 4 and Figures 5 to 10 corresponding to features in Figures 1 to 3 have corresponding numbers prefixed "1" and "2" respectively.

Figure 1 shows a side view of one preferred embodiment of the present invention. The bottle 10 has a base 12, sidewall 14 and neck finish 16.

The neck finish 16 has a raised profile 18 for receiving a closure (not shown). The raised profile 18 may be threaded, with a spiral thread for receiving closure which would have a complimentary groove. In this type of arrangement, the closure is screwed on to seal the contents of the bottle 10, and unscrewed to access its contents. Alternatively, raised profile 18 may be an annular protrusion. The closure would be applied to the neck finish16 over the raised profile 18 after the bottle 10 has been filled. In this arrangement, the closure is usually disposable, and the user opens the bottle 10, the closure is discarded.

The base 12 of bottle 10 is flat. A recess 20 is provided in base 12 which extends inwardly of the bottle 10. The shape of the recess may take a variety of forms. Recess 20 is formed from wall surface 21.

Recess 20 may have a groove for receiving a threaded neck finish 16 or raised profile 18. This groove pattern may be similar to the groove used in closures 19 of the type used to seal the bottle 10 when it has this type of neck finish arrangement. In this type of arrangement, the user can engage bottle 10 with a second bottle 10' by inserting neck finish 16 of bottle 10 into recess 20' of bottle 10', and rotating bottle 10 until neck finish 16 has engaged recess 20'.

Alternatively, recess 20 may have a complementary arrangement for the neck finish 16 of another bottle.

In one form, the recess may have an annular protrusion (not shown) so that the cross-sectional area of the recess is narrowest at the annular protrusion. This protrusion may be continuous or ribbed. In this type of arrangement, the user can engage bottle 10 with a second bottle 10' by inserting neck finish 16 of bottle 10 into recess 20' of bottle 10', and forcing bottle 10 until neck finish 16 has engaged recess 20'. The engagement will occur when the neck finish 16 has passed the annular protrusion of bottle 10' sufficiently to engage bottle 10.

In another form, the neck finish may be provided with an annular protrusion (not shown). The recess may have a complimentary annular socket for receiving the annular protrusion. However, depending on the resiliency of the materials chosen, this may not be required. The bottles can be connected as previously described, and the engagement will occur when the annular protrusion has either matched the location of the annular socket or when it has been sufficiently gripped by the recess.

In another alternate embodiment, recess 20 may be tapered inwardly, so that its cross-section area is greatest at the base 12. In this type of arrangement, the user can engage bottle 10 with a second bottle 10' by

inserting neck finish 16 of bottle 10 into recess 20' of bottle 10', and forcing bottle 10 until neck finish 16 has engaged recess 20' towards the inner end of the recess.

Sidewall 14 has a substantially square cross-section and can be represented as 4 individual walls 22, 24, 26 and 28. Usually rounded corners are provided where adjacent walls meet. Opposing walls 22 and 24 have groove 32 and 34 formed therein. The groove extends in the longitudinal direction, ie from the base to the neck finish. However, it is possible for the groove to extend laterally also. The groove 32 and 34 may extend from the top of the sidewall 35 (the neck finish end) towards the base, partially along the sidewall. Alternatively the groove may extend from the base up towards the neck finish. Alternately still, the groove may extend continuously along the length of the sidewall.

Sidewall 14 may also have ribs 36 and 38 formed in opposing walls 26 and 28. The ribs 36 and 38 may have a complimentary fit to the groove 32 and 34 on walls 22 and 24. The comparison of views between each of these sides can also be seen when Figures 1 and 3 are compared. This is also better seen in the plan view in Figure 2.

Ribs 36 and 38 consist of projections 40, 42 having in at least a portion of a peripheral region 44, 46, 48 and 50 male undercut regions 51a, 51b, 51c and 51d. Grooves 32 and 34 have corresponding female undercut regions 52a, b, c, and d.

The interrelationship between pairs of undercut is best depicted in Figure 10 where female undercut regions 252 a and b of first bottle 210A inter-engage with male undercut regions 251a and 251b so that bottles 210A and 210B are retained together. The undercut regions run in opposite pairs along substantially the entire length of grooves 32 and 34 and ribs 36 and 38.

Various complementary arrangements are foreshadowed, and include the click-fitting techniques described in relation to the base and recess. In

addition sliding of the ribs into the grooves is another method of engaging two bottles together.

The ability to join adjacent bottles by a click-fitting technique may be brought about by a number of factors including:

i) the resilience of the projection 240 and the recess defining wall which define the female undercut regions 252a and 252b.

ii) the depth and breadth of the projections 240 and corresponding recess defining wall.

iii) the radii and dimensions of the undercut regions 251a, 251b, 252a and 252b.

iv) the ratio of the area of projection 260 to the cross sectioned area of the bottle 262.

It is postulated that area 260 should be about 2.5% or greater than the area 262 for a secure interlocking to take place.

The ability to join adjacent bottles by sliding the projection 240 into and along recess 220 is also brought about by some of the factors mentioned above but because the sliding connection does not require the same degree of precision of these factors. Most preferably the bottles of the invention are engineered to allow both click fitting and slide fitting engagement. The forces required to perform both types of engagement are preferably such that children can easily join and disassemble adjacent bottles, yet the bottles once joined do not separate so easily as to inhibit playful enjoyment.

Ribs 36 and 38 are continuous and may extend sufficiently along the sidewall to so that they can engage the grooves. In this regard, they may extend to the same length as those ribs but may only extend a percentage of the groove length. A comparison of the embodiments in Figures 1 and 4 show two differing embodiments of the groove/rib arrangements. Figure 4, shows a different type of groove and rib arrangement, wherein the grooves 132 and 134 and ribs 136 and 138 extend substantially along the length of the sidewall 114.

In the embodiments in Figures 1 and 5 the side wall 14 of the bottle 10 comprises a shoulder region 54 and a waist region 56. It can be seen that ribs 36 and 38 extend radially from the bottle beyond the periphery of the waist region 56 located below the male engagement portion by distance 58. This enables adjacent bottles to be slidally connected without interference. An annular reinforcing groove 260 may be provided where shoulder region 254 and waist region 256 meet to strengthen sidewall 214.

Preferably waist region 256 is octagonal for ease of mouldering yet it will still allow good interlocking.

Alternatively, ribs 36 and 38 do not need to be continuous and instead may appear as a plurality of knobs or buttons.

The grooves and ribs/knobs can engage each other by click-fitting as previously described or by sliding the ribs into the channels.

Further, grooves 32 and 34 may have closed ends 62 so that the bottom 264 of a rib inserted into the groove abuts the closed end to prevent the rib sliding out of the groove.

In another alternative form, instead of a single groove, being formed on a face, a number of grooves may be formed that that can receive at least one or more ribs/knobs. Alternatively still, instead of a groove, a single indentation or even a plurality of indentations, having a complimentary arrangement of knob(s) may be provided to laterally engage two bottles together.

In use, the neck finish 18 of a first modular bottle 10 may be inserted into the recess 20 of a second modular bottle 10 to connect them together in a longitudinal direction. In addition, ribs 36 or 38 of a first modular bottle 10 can be click fitted, or slid into grooves 32 and 34 of a second modular bottle 10 for laterally connecting them together. The modular bottles may be connected to form an array as seen in the example in Figure 11.

laterally connecting them together. The modular bottles may be connected to form an array as seen in the example in Figure 11.

Bottles of the present invention may be made from any suitable material known in the art but is preferably a thermoplastic polymer such as polyethylene terephthalate (PET), polyethylene or the like. Bottles of the present invention are preferably manufactured by blow moulding, although it will be appreciated that other conventional techniques for making bottles may be used. Finally, it is to be understood that various alterations, modifications and/or additions may be introduced into the device previously described without departing from the spirit or ambit of the invention.

CLAIMS:

1. A modular bottle having

a neck finish

a base

a sidewall extending between the neck finish and the base

the sidewall having at least one male engagement portion

and at least one complimentary female engagement portion

wherein the male and female engagement portions are configured such that the male engagement portion of said modular bottle may be engaged with the female engagement portion of an identical second such modular bottle such that the two bottles are releasably interlocked together.

2. A modular bottle according to claim 1 wherein said bottle has two male engagement portions and two female engagement portions.

3. A modular bottle according to claim 1 or 2 wherein said male and female engagement portions are spaced equally circumferentially about said sidewall.

4. A modular bottle according to claim 1, 2 or 3 wherein said male and female engagement portions are alternately disposed about said sidewall.

5. A modular bottle according to any one of claims 1 to 4 wherein said male engagement portion comprises a projection having in at least a portion of a peripheral region and male undercut region, and said female engagement portion comprises a wall defining a recess at least a portion of said wall defining female undercut region, such that when the projection of said modular bottle is inserted into the recess of a second such modular bottle, the two bottles are releasably interlocked together by interaction between said male undercut region and said female undercut region.

6. A modular bottle according to claim 5 wherein said projection includes a pair of opposite male undercut regions and said wall includes a pair of opposite female undercut regions.

7. A modular bottle according to any one of claims 1 to 6 wherein said sidewall comprises

a shoulder region

a waist region extending from the bottom of the base, and where the bottom of the shoulder region and the top of the waist region meet.

8. A modular bottle according to any one of claims 1 to 7 wherein said female engagement portion comprises a longitudinal groove in said sidewall.

9. A modular bottle according to claims 1 to 8 wherein said female engagement portion extends only across said shoulder region.

10. A modular bottle according to claims 8 or 9 wherein said longitudinal groove has an axis which is parallel to the vertical axis of the bottle.

11. A modular bottle according to any one of claims 1 to 10 wherein said male engagement portion comprises an elongate rib in said sidewall.

12. A modular bottle according to claim 11 wherein said male engagement portion extends only across said shoulder region.

13. A modular bottle according to claim 11 or 12 wherein said elongate rib has an axis which is parallel to the vertical axis of the bottle.

14. A modular bottle according to claims 7 and 11 wherein the male engagement portion extends radially from the bottle beyond the periphery of the waist region located below the male engagement portion.

15. A modular bottle according to claim 14 wherein said waist region includes an annular reinforcing groove in the region where the top of the waist region meets the bottom of the shoulder region.

16. A modular bottle according to any one of claims 1 to 15 wherein the sidewall is substantially cylindrical except for the portion of the sidewall

which constitutes the male engagement portion and the female engagement portion.

17. A modular bottle according to claim 7 wherein said waist region is substantially polyhedral in transverse section.

18. A modular bottle according to claim 17 wherein said waist region is substantially octagonal.

19. A modular bottle according to any one of claims 8 to 18 wherein said male engagement portion is engageable with the female engagement portion of said second modular bottle by sliding the male engagement portion along said longitudinal groove to releasably interlock therewith.

20. A modular bottle according to any one of claims 8 to 18 wherein said male engagement portion is engageable with the female engagement portion of said second modular bottle by depressing the male engagement portion laterally into said longitudinal groove to releasably interlock therewith.

21. A modular bottle according to claims 19 and 20 wherein said male and female engagement portions of a first and second bottle are configured such that they are capable of being interlocked by both slideable engagement or press-fit engagement.

22. A modular bottle according to any one of claims 5 to 21 wherein said projection and/or said wall are resilient such that upon insertion of said projection into said recess said projection and/or said wall deform to allow positive location and retention of the male undercut region with the female undercut region.

23. A modular bottle according to any one of claims 8 to 21 wherein said longitudinal groove has a closed end past which said projection cannot slide.

24. A modular bottle according to claim 22 wherein said closed end is proximate the bottom of said shoulder region.

25. A modular bottle according to any one of claims 1 to 24 wherein said base has a wall surface defining recess adapted to receive and releasably interlock with a neck finish of another identical such modular bottle.

26. A modular bottle according to claim 25 wherein said neck finish includes thread portions which frictionally engage with at least a portion of said wall surface.

27. A modular bottle according to any one of claims 1 to 24 wherein said base has a wall surface defining a recess adapted to receive and releasably engage with a closure positioned on the neck finish of another identical such modular bottle.

28. A modular bottle according to any one of claims 25 to 27 wherein said wall surface tapers inwardly from said base towards said neck finish.

29. A modular bottle according to any one of claims 25 to 28 wherein said wall surface includes interference means to engage the neck finish or a closure positioned on the neck finish of another identical such modular bottle.

30. A modular bottle according to claims 2 and 25 which can be concurrently releasable connected to up to six other such modular bottles.

31. A modular bottle according to claim 1 substantially as herein before described with reference to any one of the drawings.

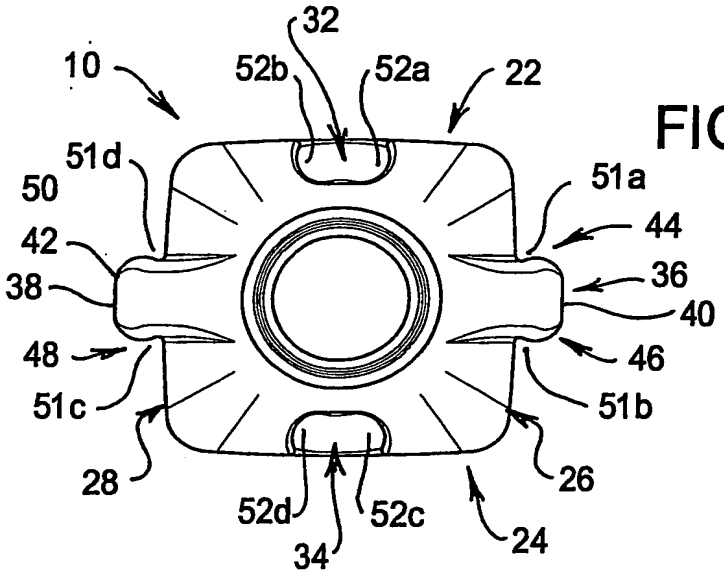


FIG 2

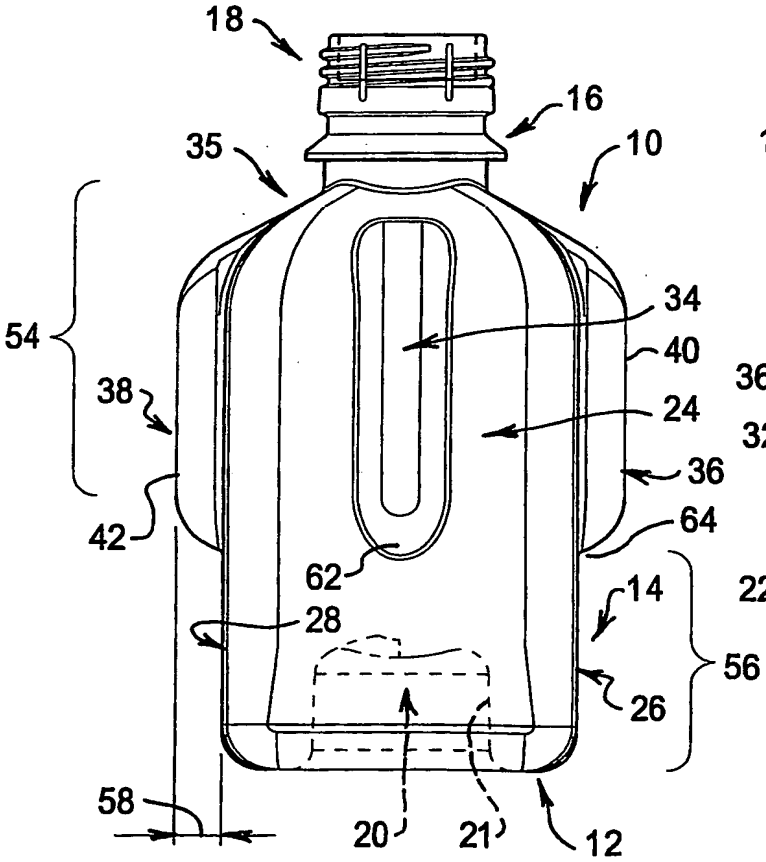


FIG 1

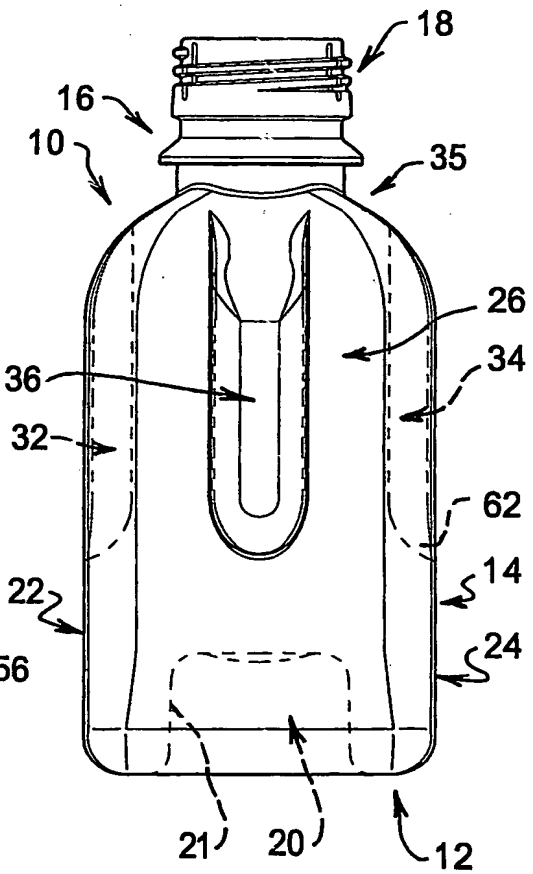


FIG 3

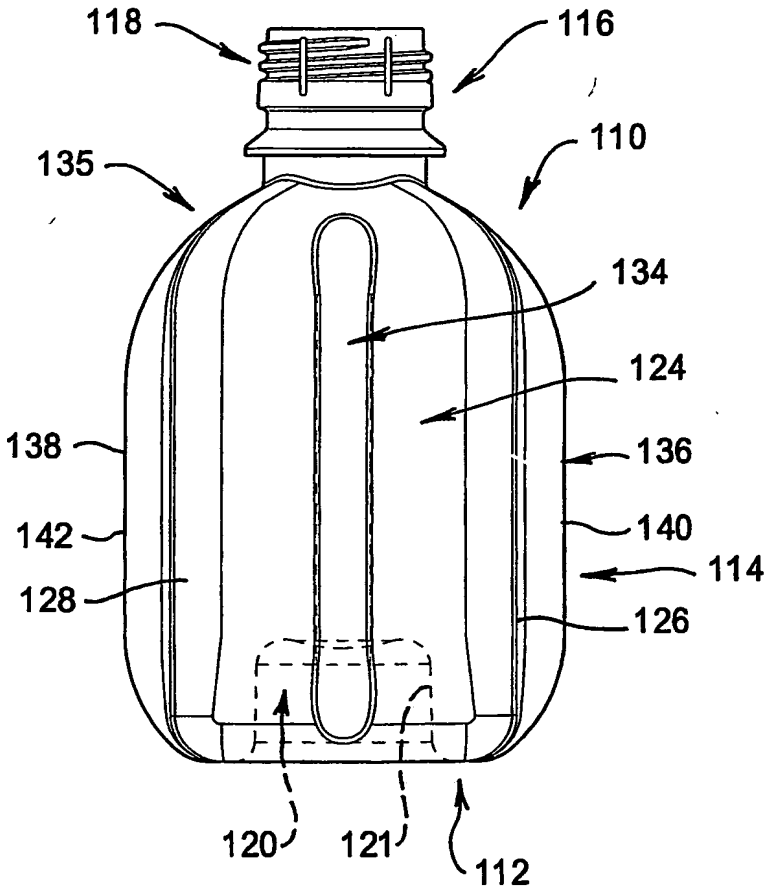


FIG 4

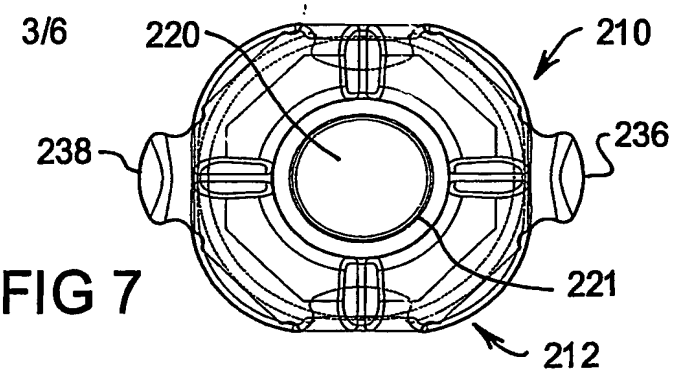


FIG 7

FIG 5

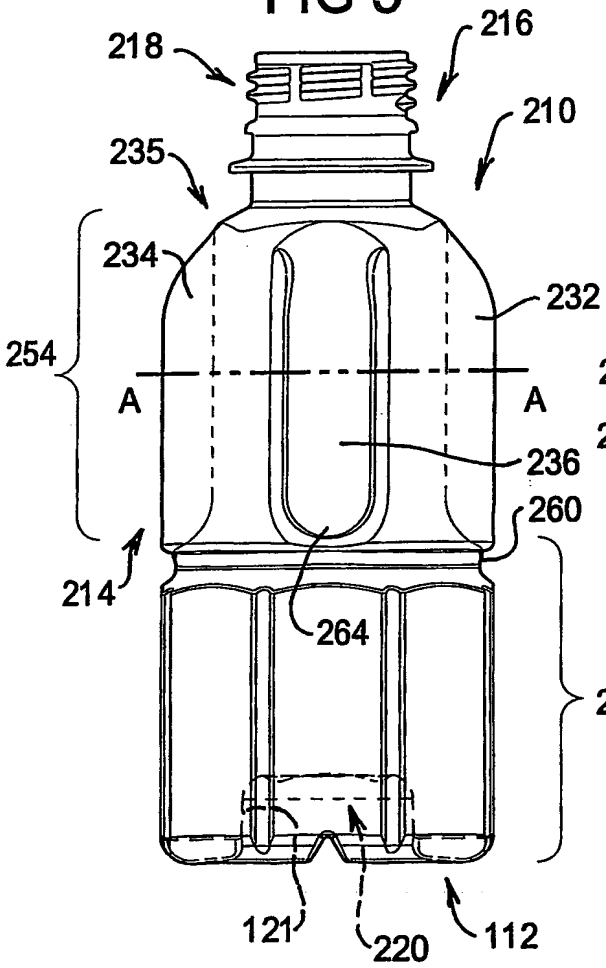


FIG 6

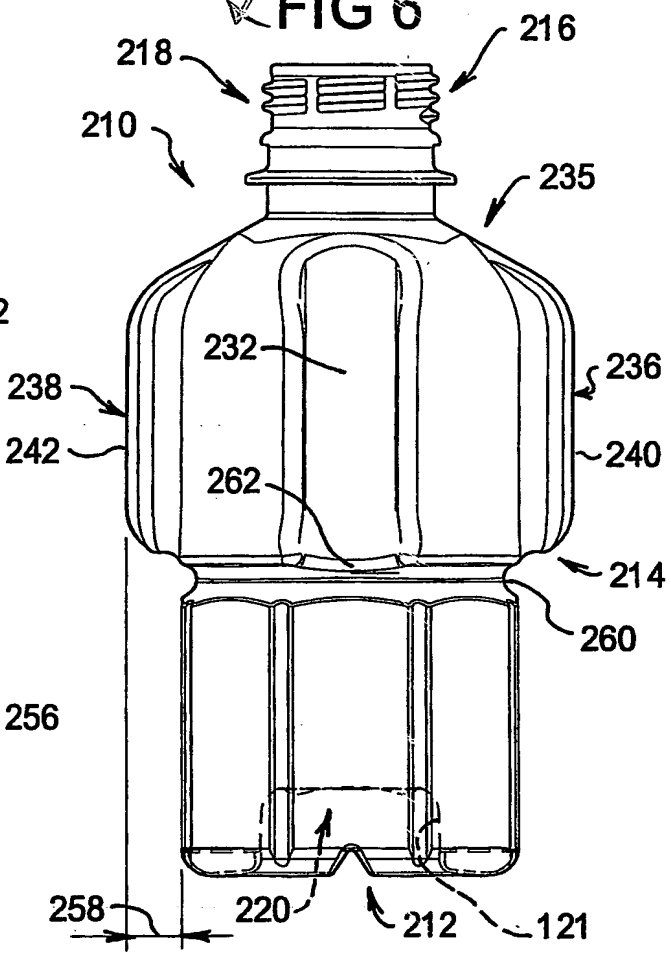
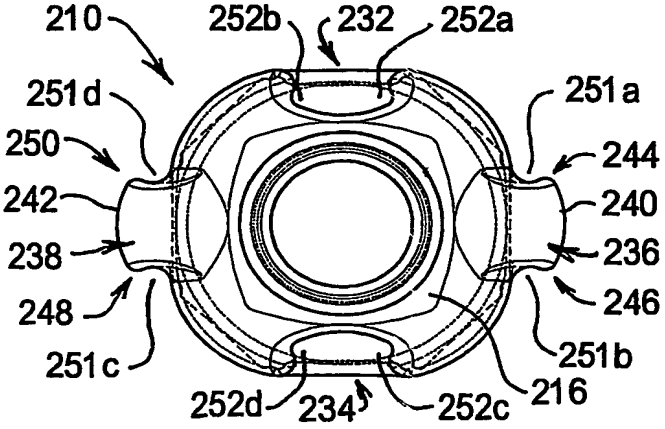


FIG 8



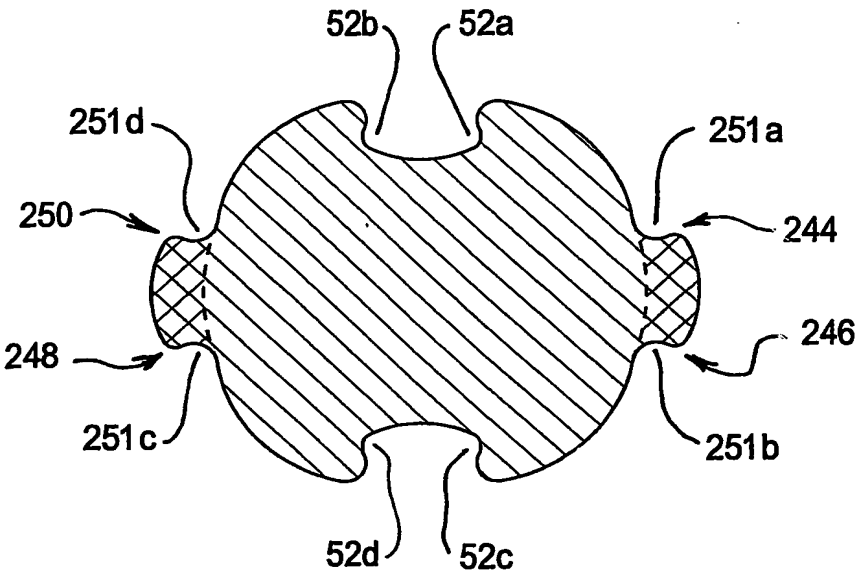


FIG 9

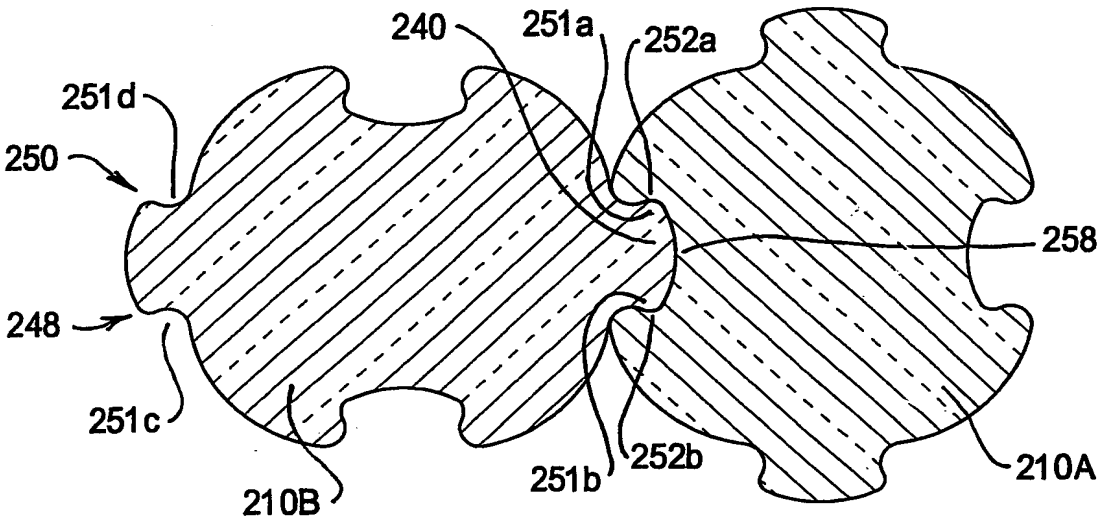


FIG 10

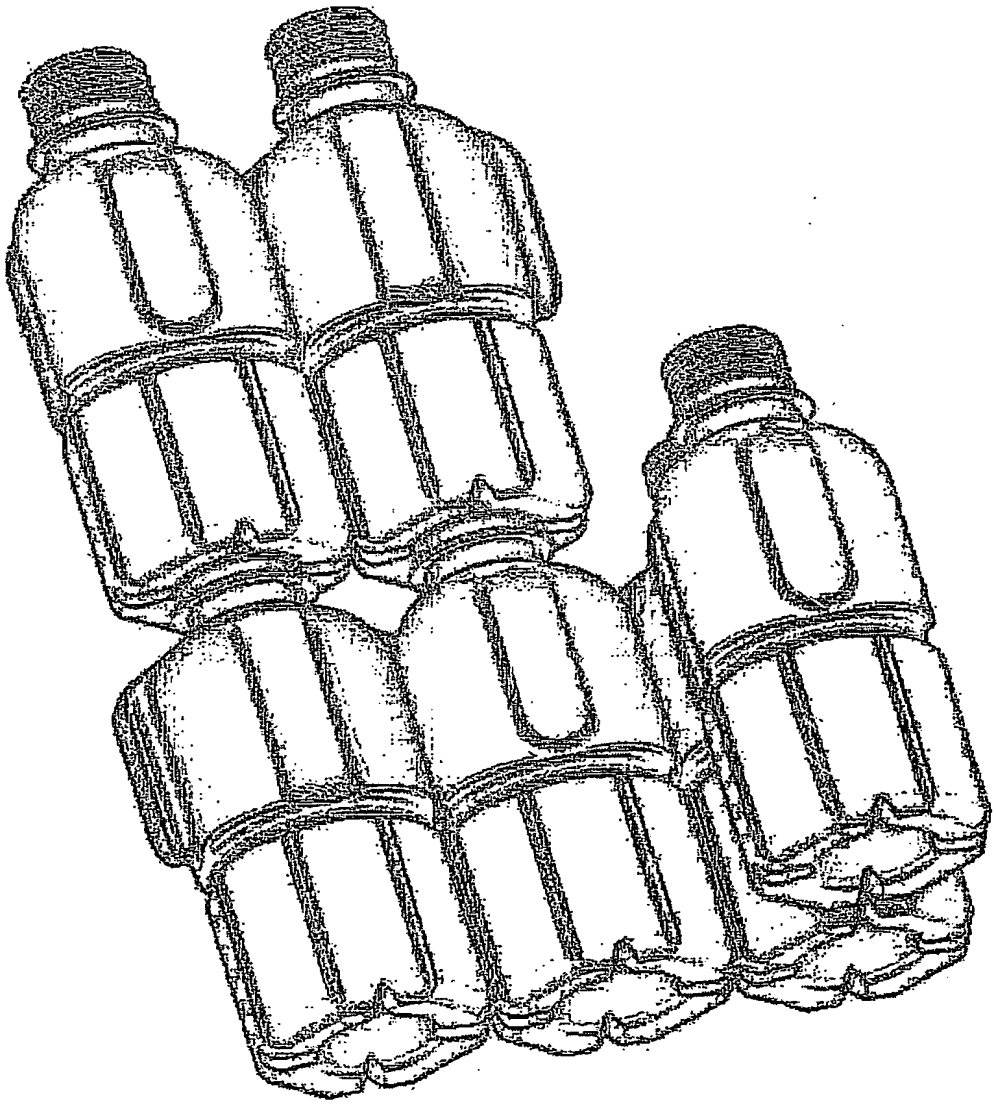


FIG 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU02/01738

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: B65D 21/028, 21/02, 1/40, A63H 33/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
REFER ELECTRONIC DATA BASE CONSULTED BELOW

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
DWPI keywords: BOTTLE, MODULAR, INTERFIT, CONNECT, PROJECTION, MALE, GROOVE, FEMALE, RELEASE, DETACH and similar terms
ESP@CE IPC B65D 21/028 and similar keywords as above

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 01/08989 A (PRETORIUS) 8 February 2001 See whole document See whole document	1-24, 30, 31 25-29
X	DE 19517460 A (MOSER REINHOLD) 14 November 1996 See abstract and figures	1-14, 15-31
X	EP 857664 A (FASCI) 12 August 1998 See whole document - particularly figures 13-B & 14-B	1-14, 17-21, 25-31

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

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Date of the actual completion of the international search
23 January 2003

Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU02/01738

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4624383 A (MOORE) 25 November 1986 See whole document	1-14, 17-19, 21, 25-31
X Y	US 3194426 A (BROWN) 13 July 1965 See whole document See whole document	1-14, 17-19, 21, 30, 31 25-29
X Y	CA 2174781 A (PANZO) 24 October 1997 See whole document See whole document	1-14, 16, 19, 21 25-29
Y	WO 01/51386 A (RABATIC) 19 July 2001 See whole document	25-29

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU02/01738

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
WO	200108989	AU	200073910				
DE	19517460	NONE					
EP	857664	AU	52985/98	CA	2228656	JP	11001233
		US	6276549				
US	4624383	NONE					
US	3194426	NONE					
CA	2174781	NONE					
WO	200151386	AU	200024552	EP	1163168	HR	20000021

END OF ANNEX